2003 NPDES PROGRESS REPORT

CEDAR-GREEN, ISLAND-SNOHOMISH, AND SOUTH PUGET SOUND WATER QUALITY MANAGEMENT AREAS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM MS4 PERMITS WASM10001, WASM20001, AND WASM30001

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Water Quality Program
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Water Quality Program
Olympia, Washington

CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPENDIXES

SECTION 1.0
OVERVIEW

Pursuant to the National Pollutant Discharge Elimination System (NPDES) requirements for Multiple Separate Storm Sewer Systems (MS4), the Washington State Department of Transportation (WSDOT) prepared a Stormwater Management Plan (SWMP), which was approved by the Washington State Department of Ecology (Ecology) on 3 July 1997 [WSDOT 1997(a)]. The plan was prepared in response to the issuance of NPDES and State Waste Discharge General Permits on 5 July 1995 and effective on 4 August 1995, which designated WSDOT as a co-permitee for discharges from municipal separate storm sewers within the following water quality management areas:

- The Cedar-Green Water Quality Management Area (and the portion of the Kitsap Water Quality Management Area located in King County).

- The Island Snohomish Water Quality Management Area (and the portion of the Skagit-Stillaguamish Water Quality Area located in Snohomish County).

- The South Puget Sound Water Quality Management Area (and the portion of the Kitsap Water Quality Management Area located in Pierce County).

As it was initially presumed that Clark County would also require a permit, WSDOT has also been reporting on stormwater-related activities in Clark County, for example BMP construction.

The WSDOT SWMP was prepared to address the requirements specified under Section 122.26 of Title 40 of the Code of Federal Regulations (40 CFR 122.26), the Water Pollution Control requirements stipulated in Chapter 90.48 of the Revised Code of Washington (RCW 90.48), and the regulatory requirements for the NPDES permit program in Washington State as delineated in Chapter 173-220 of the Washington Administrative Code (WAC 173-220). The SWMP outlines WSDOT's plan to comply with federal and state standards for point source wastewater discharges including compliance with the state and federal NPDES programs. The SWMP and associated permits cover large and medium MS4 discharges for the Cedar-Green, Island-Snohomish, and South Puget Sound management areas. As initially drafted, the three referenced NPDES MS4 permits were to expire on 5 July 2000. At this time, new permit conditions

are still being drafted by Ecology in cooperation with the permittees. Meanwhile, WSDOT with Ecology concurrence has applied for its own statewide NPDES municipal stormwater permit, which will fulfill Phase I and II permitting requirements. Ecology has extended the above referenced permits, continuing current permit requirements until the next permit(s) is (are) issued. Therefore, the 1995 permit requirements and associated 1997 SWMP remain in effect at this time.

One of the conditions of WSDOT's NPDES permit is that an annual report be prepared summarizing WSDOT's efforts to comply with the permits and SWMP, and evaluating the effectiveness of the stormwater program. The purpose of this 2003 Annual Report is to document stormwater-related activities for the period from 5 July 2002 through 4 July 2003, within the three NPDES MS4 permit areas. This report has been developed to reflect WSDOT activities based on the suite of commitments established in the SWMP.

In addition to the requirements placed on WSDOT by the NPDES program, the agency is striving to meet stormwater management needs associated with the Endangered Species Act (ESA). Implementation of stormwater management practices relating to ESA considerations is defined in WSDOT Instructional Letter (IL) 4020.02, entitled *Endangered Species Act (ESA) Stormwater Effects.* The purpose of IL 4020.02 is to provide interim guidance on making stormwater-related *effect determinations* for biological assessments that are prepared for the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS). It is also intended to provide transitional criteria between the current WSDOT *Highway Runoff Manual* (HRM, WSDOT 1995) and the revised Highway Runoff Manual to be completed in late 2003 or early 2004. The HRM is being revised in response to publication of the *Stormwater Management Manual for Western Washington* (Ecology 2001), in August 2001.

This report has been organized to provide an overview and status of the priority elements for the stormwater management program as outlined in the SWMP. Section 2 provides a summary of activities within the current reporting period for the six high priority elements identified in the SWMP. Section 3 provides an overview of the status of NPDES-related funding and resource allocations for the period. Section 4 includes an overview of maintenance practices and a general discussion of the status of stormwater facility management, and summarizes retrofit program planning activities during the current reporting period. Section 5 summarizes activities relating to the construction site controls and training program, and Section 6 addresses activities relating to watershed-level management and planning, as well as an update on WSDOT cost/benefit analysis efforts. Monitoring activities relating to the NPDES program are summarized in Section 7, along with the status of the research program over the past year.

The certification statement for the document is provided in Section 8. The references cited in the report are provided in Section 9. Unless otherwise specified, the references cited throughout this report are available through WSDOT's Environmental Services Office (ESO) Water Quality Program, and can be obtained upon request.

SECTION 2.0
STATUS OF STORMWATER PROGRAM PRIORITIES

Six elements were identified in the 1997 Stormwater Management Plan as having the highest priority: (1) construction of structural stormwater best management practice (BMP) facilities; (2) monitoring and research related to stormwater BMPs; (3) erosion and sediment control programs; (4) attaining full funding for operations and maintenance programs; (5) watershed-based mitigation strategies; (6) water quality-related training. These elements continue to be high priorities for WSDOT. Construction of structural controls at new outfall sites continues to receive increased emphasis due to the federal listings associated with salmon and other salmonids under the ESA.

As detailed in Section 3.0, during the 2002/2003 permit period, WSDOT spent an estimated $25.8 million dollars on construction of structural stormwater controls at new outfalls, an increase of $10.5 million over the previous reporting period. Expenditures relating to retrofits of existing stormwater outfalls increased from $200,000 in the previous period to $396,000 in the current period. Expenditures continue to increase for efforts relating to educational programs, policy and guidance development, and research programs.

Stormwater-related monitoring and research efforts continued. Section 7 of this report presents projects related to stormwater characterization and/or BMP performance-related monitoring and research. These projects have either recently been completed or are in progress. They include a wide range of previously identified research needs, including: characterizing general stormwater runoff and pollutant levels in Western Washington through evaluating the effectiveness of BMPs constructed using existing technology; evaluating innovative technologies; and evaluating appropriate and effective maintenance practices. Approximately $240,000 was spent on these activities (refer to Table 3-1) during the current reporting period.

The Erosion and Sediment Control Program (ECP) continues to improve its training, technical assistance, and compliance assurance activities in an effort to control construction site impacts.

During the reporting period, a total of 677 people received training through WSDOT's *Construction Site Erosion & Sediment Control Certification* course. Of those trained, 220 were WSDOT employees and 550 were a mix of private sector and non-WSDOT public sector personnel.

The ECP updated its existing resources used for Temporary Erosion and Sediment Control (TESC) planning and budgeting, namely its Products and Services Database. In addition, existing contractual language (*Standard Specifications for Road, Bridge and Municipal Construction, M 41-10*) was updated and expanded to enhance TESC plan implementation, and an entirely new set of design templates (Standard Plans) was developed and approved for use by WSDOT and the Federal Highway Administration.

Results from the ECP 2002 Fall Assessment, which evaluated 29 of WSDOT's most difficult construction sites, was shared with Regional/Headquarters management, as well as project engineers, to improve performance in the 2003 construction season. Compliance assurance was furthered through adoption of standardized water quality monitoring protocols, as well as violation reporting procedures.

The expenditures for WSDOT's Erosion Control Program decreased by $64,000 compared to the 2002 report. This is a result of 1) major program development tasks have been completed, 2) overall expansion of the knowledge base (for both WSDOT employees and contractors) has reduced training needs, and 3) improved efficiencies due to streamlining.

The funding level for Maintenance and Operations increased slightly, mainly in response to system additions and inflation. The emphasis on stormwater remains unchanged from the previous reporting period.

WSDOT has continued to participate in watershed-based planning programs, including working in cooperation with other state and local agencies and planning groups, to provide watershed-scale technical support when appropriate. WSDOT is implementing a new approach to watershed assessment based on direction from the Transportation Permit Efficiency and Accountability Committee (TPEAC) that focuses on increasing environmental benefits, streamlining the permitting process, reducing mitigation costs, and enhancing the public participation process. WSDOT is also committed to using tools such as reach analysis and streambank protection guidelines to improve natural stream conditions while protecting transportation infrastructure. WSDOT continues to provide active representation on Watershed Management Act and Salmon Recovery Act-related committees, when appropriate, and has a developing

program that uses River Corridor Analysis throughout the state to assess and address chronic problems (deficiencies) associated with bank erosion and transportation infrastructure. WSDOT has also focused available resources on assessing the costs and benefits of implementing the various elements of the stormwater management program, and deriving a better understanding of life cycle maintenance costs for BMPs.

WSDOT also continues to sponsor conferences and workshops related to water quality topics and to provide specific training to employees and training opportunities to outside personnel. Examples include the Temporary Erosion and Sediment Control Program, Adopt-A-Highway Program, Trip Reduction Program, and wetland mitigation workshops. In addition, WSDOT offers opportunities to the public to be involved in transportation planning activities.

Medium and low priority activities that were identified in the SWMP included: supporting public education programs; determining maintenance requirements for BMPs; developing a tracking system for structural BMPs; identifying illicit discharges; developing a tracking system for operations and maintenance activities; monitoring operations and maintenance practices relative to water quality impacts; and developing budgetary mechanisms to fund maintenance activities associated with water quality improvements. Progress continues to be made in most of the above categories, subject to the availability of resources and funding. Some milestones have been reached in the area of stormwater facilities inventory and prioritization. The Stormwater Outfall Inventory Database has undergone revisions that enable it to manage large amounts of data and provide a convenient means for WSDOT user groups to obtain outfall information from one location, as described in Section 4.2.3.

In summary, WSDOT has continued to focus on previously defined priority needs, and is striving to meet the suite of commitments identified in the SWMP. Substantial progress has been made during the current reporting period in defining the key stormwater program management elements that require enhancement to support future funding, prioritization, and program implementation. Additional efforts have been made to ensure that WSDOT's efforts are well coordinated with the individual programs involved in the various aspects of the NPDES compliance and implementation program.

SECTION 3.0
FINANCIAL AND RESOURCE ASSESSMENT

Table 3-1 depicts stormwater related expenditures for the 8-year period in which the current NPDES MS4 permits have been in place. These numbers were generated to reflect expenditures within the general NPDES Phase I permit areas. The table is provided for comparison with Table 25 in the Stormwater Management Plan [WSDOT 1997(a)], which projected budget estimates for the listed budgetary and activity areas through the 1999/2000 permit period.

Spending on retrofit projects increased over the previous reporting period (WSDOT 2002). Retrofit costs are estimated as a percentage of capital improvement project costs, because expenditures are generally proportionate to funding levels for these projects. In this reporting period, however, BMP construction expenditures increased substantially relative to the number of BMPs installed. This increase in estimated BMP costs may have resulted from a combination of: 1) BMPs were designed in accordance with the more stringent standards in Ecology's 2001 Stormwater Management Manual; 2) other project costs increased, skewing the BMP cost estimates; 3) one year may not be a long enough period to accurately reflect BMP costs using project costs, due to the lag time associated with construction cost reporting.

Expenditures increased for stormwater and BMP research programs. Spending on erosion control and spill prevention training decreased in 2002-2003, due largely to the fact that WSDOT has caught up with the statewide demand. WSDOT's active support in the current development of the Ecology *Stormwater Management Manual for Eastern Washington* is reflected in the budget elements for the current reporting period, as is the effort to revise WSDOT's Highway Runoff Manual, which is approximately 60 percent complete.

TABLE 3-1. WSDOT STORMWATER MANAGEMENT PLAN BUDGET ELEMENTS

AND STORMWATER EXPENDITURES OCCURRING WITHIN THE NPDES PHASE I PERMIT AREA

(IN THOUSANDS OF DOLLARS)

Program Element	1995/1996	1996/1997	1997/1998	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
Stormwater BMP Construction in Highway Improvement Projects	$20,000[1)(	$20,00[1]	$20,000[1]	$20,000[1]	$15,22[1,2]	$15,333[1,2]	$15,313[1,2]	$25,877[1,2]
Stormwater Characterization and BMP Monitoring	$94	$94	$100	$100	$25	$79	$53	$110
NPDES Permit Fees	$46	$46	$48	$50	$52	$52	$60	$36
NPDES/ESA Erosion Control and Spill Prevention Training	$0	$0	$0	$0	$148	$194	$229	$165
Highway Runoff Manual and Eastern Washington Stormwater Design Manual Development	$0	$0	$0	$0	$138	$0	$43	$520
Stormwater and BMP Research Programs	$143	$143	$83	$83	$262	$370	$85	$125
I-4 Stormwater BMP Retrofit Projects	$0	$0	$0	$0	$65	$1,141	$200	$396
Stormwater Research Implementation	$0	$0	$98	$138	$140	$125	$26	$5
Stormwater Utility Fees	$886	$886	$886	$886	$886	$886	$886	$1,901

(1) Estimated at 5 percent of total project cost.
(2) Reflects decreases for State Highway Improvement (Category I) projects resulting from decreases in revenue caused by passage of Initiate 695 in November 1999.

SECTION 4.0
OPERATIONS AND MAINTENANCE

This section includes an overview of maintenance practices for operating highways, and information on the annual maintenance of structural controls and BMPs, research developments in ice and snow control, summary information pertaining to de-icer quantities and expenditures, use of pesticides and fertilizers, roadway sweeping, and the process of tracking hazardous material incidents. Also included is a general discussion of stormwater facility management practices that covers newly constructed facilities, illicit discharge points, the revised outfall inventory, and the stormwater outfall retrofit program.

4.1 MAINTENANCE PRACTICES FOR OPERATING HIGHWAYS

Commitments to maintenance practices described in the SWMP include: (1) tracking maintenance and repairs to structural controls and BMPs; (2) estimating volumes of ice and snow control material and pesticides and fertilizers applied to roads and roadsides, and research activities associated with those materials; (3) implementing an Integrated Vegetation Management Plan; and (4) reporting highway sweeping activities and tracking hazardous material spills.

Proper road maintenance reduces impacts of vehicle use and road wear, providing at least three benefits: (1) helping to ensure the safety of the traveling public; (2) preserving the infrastructure; and (3) serving as mitigation for environmental impacts associated with road construction, preservation, and maintenance during the life of the structure. Maintaining the roadway and roadside to their original condition improves stormwater through re-creation of the original conditions of the right of way.

4.1.1 Sensitive Area Mapping

To identify environmentally sensitive roadsides potentially impacted by maintenance activities, WSDOT completed the marking and mapping of environmentally sensitive areas in the field. These activities include those to maintain stormwater control structures and facilities. This mapping project identifies all sensitive area locations and provides guidance to WSDOT maintenance crews so that BMPs can be applied to eliminate or reduce impacts of maintenance activities on streams, wetlands, and water bodies. This effort was identified and summarized in the 6th Year NPDES Annual Report (WSDOT 2001). An update on the status and schedule is provided below.

- **Sensitive Area Identification:** North Central and Southwest Regions were completed in 2000; South Central Region completed in 2001; Northwest and Olympic Regions completed in 2001; Eastern Region completed in 2001.

- **Mapping of Sensitive Areas:** North Central and South Central Region atlases completed in 2002; Northwest, Eastern, Southwest, and Olympic Region atlases completed April 2003.

  The goal is to have an atlas in every Maintenance work vehicle, enabling workers to identify sensitive areas as they perform their daily tasks.

4.1.2 Maintenance of Structural Controls and BMPs

As described in last year's progress report, there is no system specifically designed to track the frequency of maintenance activities. Instead, this information is evaluated indirectly through analysis of Transportation Reporting and Accounting Information System (TRAINS) data. TRAINS is a labor accounting system that tracks activities based on maintenance activity, labor, and equipment costs incurred.

The same estimating method described in the 7th Year NPDES Annual Report (WSDOT 2002) was used for assessing maintenance activities in the current reporting period. TRAINS was queried to determine expenditures and personnel hours spent on specific activities. Because the TRAINS system tracks activities for the entire state, some manipulation was necessary to correlate the numbers to the NPDES permit areas. Detailed surveys of the number of stormwater systems (i.e., catch basins, separators, drainage facilities, or channel conveyance systems) controlled by WSDOT over small areas were first extrapolated to a region-wide estimate of the total number of facilities. This information was further extrapolated for each permit area based on the size of the area. This estimating methodology served as the basis for the development of Table 4-1. Although the information does not precisely reflect activity in the permit area, by using a consistent estimating method, differences between years can be evaluated.

Overall, expenditures decreased slightly and time commitments remained nearly the same for stormwater-related operations and maintenance activities in the 2002/2003 reporting period compared to the 2001/2002 reporting period. However, there were significant changes in the allocations for specific activities. For example, costs for sand clean-up, sanding, and anti-icing/de-icing decreased considerably, while costs for sweeping and cleaning pavement, culvert maintenance, and residual herbicide application

increased noticeably. These differences are more a reflection of day-to-day operations and maintenance needs than a change in priorities.

TABLE 4-1. BUDGET AND PERSONNEL HOURS ALLOCATED TO STORMWATER FACILITY O&M ACTIVITIES IN THE NPDES PERMIT AREA AS TRACKED THROUGH THE TRANSPORTATION REPORTING AND ACCOUNTING INFORMATION SYSTEM

O&M Activity Type	Dollars Spent in 2001/2002	Personnel Hours 2001/2002	Dollars Spent in 2002/2003	Personnel Hours 20021/2003
Grade/Reshape Shoulder	$99,448	1,620	$92,172	1,831
Sweeping and Cleaning Pavement	$513,468	9,761	$628,035	11,958
Ditching and Channel Maintenance	$185,329	3,878	$168,549	3,273
Culvert Maintenance	$99,340	2,023	$114,315	2,523
Manhole, Catch Basin, and Grate Maintenance	$517,979	5,171	$228,966	5,502
Detention/Retention Maintenance	$ 31,541	65	$40,232	306
Miscellaneous Drainage Maintenance	$136,162	980	$138,876	580
Weed Control Fertilizing and Liming	$300	8	$291	8
Residual Herbicide Application	$93,577	1,641	$103,514	1,806
Landscape Fertilizer and Liming	$91	2	$39	0
Litter/Litter Bag Clean-up	$203,197	4,211	$252,048	5,419
Winter Sand Clean-up	$103,029	2,274	$34,506	693
Sanding	$323,368	3,264	$166,704	1,098
Anti-icing and De-icing Chemical Application	$324,396	1,877	$260,902	1,699
Winter Drainage Maintenance	$5,352	117	$5,053	111
Hazardous Waste/Spill/Debris Clean-up	$40,847	818	$49,054	969
Total	$2,677,427	37,709	$2,283,257.00	37,786

4.1.3 Ice and Snow Control

WSDOT belongs to a consortium of transportation agencies in northwest states and Canadian provinces known as the Pacific Northwest Snowfighters (PNS). One of PNS's functions is to develop anti-icing chemical specifications for use by all member organizations. One goal for these specifications is that the chemicals are environmentally safe, and a number of criteria must be met before a chemical is approved for use, including heavy metal content and toxicity to fish. These specifications also help to standardize the market for anti-icing chemicals, resulting in better pricing and product availability for road maintenance organizations. The PNS specification for corrosion is that a corrosion-inhibited anti-icing chemical must be at least 70 percent less corrosive than sodium chloride to a given type of metal. The reduced level of corrosion is determined by a laboratory test. All current products used for winter maintenance meet these specifications.

Table 4-1, above, provides a breakdown of maintenance expenditures and personnel allocated to snow and ice maintenance activities; including: (1) winter sand clean-up; (2) sanding; (3) anti-icing and de-

icing chemical applications; and (4) winter drainage maintenance. Table 4-2 provides details on the quantities and costs of de-icer materials used in the current reporting period.

TABLE 4-2. DE-ICER QUANTITIES FOR THE WINTER OF 2002-2003		
DE-ICER	**QUANTITY**	**EXPENDITURE**
Calcium Magnesium Acetate	330,000 Gallons	$400,000.00
Geomelt C	1,573,000 Gallons	$818,165.00
Ice Slicer Elite	4,296 Tons	$1,664,583.00
Freeze Guard Zero	1,211 Tons	$89,000.00
Ice Stop	180,000 Gallons	$626,350.00
Clear Lane PNS	1,260 Tons	$200,000.00
Salt Brine	181,000 Gallons	$25,000.00
Rock Salt	1,100 Tons	$85000.00

4.1.4 Integrated Vegetation Management

WSDOT uses herbicides along with mechanical and horticultural methods to control undesirable roadside vegetation and to establish stable, low maintenance plant communities. Undesirable vegetation includes vegetation at the edge of pavement, noxious and nuisance weeds, and trees and brush that encroach on traffic operations and/or create safety hazards.

Herbicide use is tracked through a record of application that includes: (1) location and date; (2) herbicide used (by trade name); (3) total amount used; (4) number of acres treated. Table 4-3 is a summary of the acres of right of way treated and quantities (pounds of active ingredient) used, by county.

TABLE 4-3. SUMMARY OF HERBICIDE PRODUCTS USED AND THE NUMBER OF ACRES TREATED IN NPDES PERMIT COUNTIES			
County	**Number of Products Used**	**Quantity Used Pounds of Active Ingredient**	**Approximate Number Acres Treated**
Clark	16	1,858	351
King	17	4,209	1,221
Pierce	12	1,221	346
Snohomish	9	2.690	755
Thurston	16	1,087	247

The reporting of Quantity Used in this year's report is modified from previous years to provide a more accurate representation of total amounts. WSDOT's use of herbicides for the reporting period in the counties listed has increased since the 2002 report.

WSDOT area maintenance managers continue to use WSDOT's guidance for Integrated Vegetation Management (IVM) for Roadsides to guide and train field operators in roadside maintenance (WSDOT 1997b). To facilitate implementation of IVM and to better account for results, WSDOT has begun to develop and implement roadside vegetation management plans for highways throughout the state. These plans serve as information management tools to be used in the field to: (1) plan consistent routine maintenance activities; (2) identify and prioritize vegetation problem areas; (3) develop and implement site-specific long-term treatment strategies; (4) document actions taken to carry out treatments; and (5) monitor the effectiveness of maintenance treatments. These tools will also help to ensure that routine vegetation maintenance activities are consistent.

The Interstate 5 corridor, much of which is included in the NPDES permit area, is one of the first highways for which a roadside vegetation management plan is being developed and implemented. Implementation commenced on the south half (Oregon border to the Pierce/King County line) this year and will begin on the north half next year. The objective of this project is to identify and implement revised maintenance practices that improve the health and aesthetics of the roadside while reducing long-term maintenance costs and minimizing herbicide use. The *Interstate 5 Corridor Roadside Vegetation Management Plan* will document agreed-upon parameters for roadside vegetation maintenance activities and outcomes by milepost, and establish a data management system for follow-through, tracking costs and assessing the effectiveness of treatment measures. An additional component of the system currently under development is a database of plant-specific BMPs and IVM treatment prescriptions. A detailed scope has been completed for this project.

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4.1.5 Roadway Sweeping

Approximately 9,761 hours of personnel time and just over $500,000 were spent sweeping the highways within NPDES permit areas to remove large particulate matter that would otherwise have entered stormwater systems. This represents a slight reduction in time and budget over the previous reporting period.

4.1.6 Hazardous Material Tracking

Efforts to track hazardous material spills are now conducted in conjunction with the Washington State Patrol and/or the local law enforcement agency responding to the site of an accident. The information is

documented on the standard Police Traffic Collision Report (PTCR) form, which records whether a hazardous material was involved, and, if so, whether a release occurred. It does not document the quantity released or the clean-up status. However, if the collision involved a commercial carrier and met certain damage criteria, any identifying HazMat placard numbers on the vehicle are captured on the collision form. As part of a revision to the PTCR scheduled to occur within the next two to three years, the WSDOT Transportation Data Office, in conjunction with the WSDOT Environmental Services Office, Environmental Information Management Program, the Washington State Patrol, the Washington Traffic Safety Commission, and other users, will determine the feasibility of capturing additional information regarding hazardous materials incidents on the state highway system. At this time, information regarding the involvement of hazardous materials in collisions is entered into the Collision Location and Analysis System (CLAS), which is the statewide collision records system. The data is being collected and stored but there is a problem with the reporting function of the database at this time so obtaining data relating to hazardous material incidents pertaining to this permit reporting period was not possible.

4.2 STORMWATER FACILITY MANAGEMENT

Commitments to stormwater facility management in WSDOT's Stormwater Management Plan, include: (1) reporting the numbers and types of permanent stormwater control BMPs constructed; (2) inventorying illicit discharge connections and monitoring corrective actions; (3) identifying stormwater outfalls that need retrofits; (4) continuing to modify/upgrade the retrofit prioritization index, as needed.

4.2.1 New Facilities

The SWMP identified construction of permanent structural stormwater BMPs as its highest priority. Facilitating construction of BMPs to treat WSDOT's highway runoff, either through transportation improvement (for safety or capacity expansion) projects or by stand-alone retrofits, is believed to be the most efficient way to promote compliance with state water quality standards. WSDOT regional offices are required to investigate the feasibility of upgrading stormwater facilities during a highway improvement project. Determining feasibility is dependent on the level of available funding and right of way to construct stormwater BMPs.

As specified and required under WSDOT's Highway Runoff Manual (WSDOT 1995) and the *Stormwater Management Manual for Western Washington* (Ecology 2001), whenever a roadway is expanded by more than 5,000 square feet of impervious surface, WSDOT oversees the construction of permanent structural

BMPs to treat runoff for both water quality and quantity for the added impervious, or an equivalent area of impervious surface. Table 4-4 provides a summary of BMPs constructed within the general permit areas between July 2002 and July 2003. A description of each BMP type with milepost, offset direction, and facility size (where available) is provided in Appendix A.

A total of 39 BMPs were constructed within the general permit areas during the current reporting period. This is 91 fewer than were constructed during the previous reporting period (WSDOT 2002), largely due to fewer construction projects in NPDES areas. There are also many vegetated conveyances, filter strips, and buffer zones existing along many state highways which, while not engineered specifically for that purpose, are essentially functioning as structural stormwater BMPs.

TABLE 4-4. STRUCTURAL STORMWATER BEST MANAGEMENT PRACTICES COMPLETED IN THE NPDES PERMIT AREAS DURING THE 2002/2003 CONSTRUCTION SEASON

Project Designation	Number and Type of Structural BMPs Constructed			
	Open Water Detention [1]	Detention Vaults [2]	Infiltration Pond [3]	Linear Treatments [4]
SR 90 - Sunset I/C Modifications Stage 1	1			
SR 202 - Junction 228th Avenue NE		1	1	1
SR 525 - Junction Bayview Road	1			3
SR 410 - Pierce/King Cl Vic and Jct SE 456th Street	1			
SR 5 - NE 175th SB on Ramp Channelization and Signal	1	1		3
SR 20 - SR 20 to Zylstra Road				1
SR 20 - Vic Campbell Lake Road				1
SR 516 - Junction Witte Road SE Channelization and Signal Rebuild	1			1
SR 5 - 164th to SR 526 - HOV Lanes	2	2		4
SR 16 - Sprague Ave. I/C to Snake Lake - HOV	2			
SR 99 - SR 99 to 62nd Ave. E to King Co. line	2			1
SR 167 - River Road Safety Improvements				1
SR 509 - Port of Tacoma Road Grade Separation	3			4
Totals	**14**	**4**	**1**	**20**

[1] Open water detention includes detention ponds, wet ponds, and combination ponds.
[2] Detention vaults include drywells, wet vaults, swirl concentrator vaults, and oil/water separators.
[3] Infiltration pond includes infiltration ponds and dry ponds.
[4] Linear treatments include biofiltration swales, infiltration trenches, ecology ditches, and vegetated ditches.

4.2.2 Illicit Discharge

Over the current reporting period, outfalls with suspected illicit discharges were identified as part of the outfall inventory effort and entered into the Stormwater Outfall Inventory Database (refer to Section 4.2.3, Outfall Inventory and Retrofits). The database has been upgraded with querying capabilities, so that information about outfalls with suspected illicit discharges can be extracted and reports can be generated that tie this information to more than 200 additional data fields including location, prioritization, and numerous environmental data. WSDOT does not have the authority to prohibit discharges that originate off of its right of way, or to initiate enforcement actions if those discharges create a problem that is not related to the safety or integrity of the state highway [WSDOT 1997(a)]. Before committing to a more intensive inventory or investigative process, a response system for corrective actions will have to be developed.

4.2.3 Outfall Inventory and Retrofits

WSDOT's program to identify and prioritize outfalls for retrofit made significant gains during the current reporting period. Field inventory work resumed in December of 2002; and an additional 285 outfalls were inventoried as part of the pilot program described in the 2002 NPDES Annual Report. Data was collected within King, Snohomish, and Clark counties and entered into the Stormwater Outfall Inventory Database for prioritization. The new effort brings the total number of prioritized outfalls to more than 900, mostly located in the Puget Sound area. The database contains information on an additional 3,100 outfalls that were identified during the original 1993-95 inventory effort but for which there is not enough information to generate a prioritization score based on the new prioritization index and ranking system. This information will be distributed to WSDOT regional offices for continued implementation of the stormwater retrofit planning and programming process.

For the next reporting period, WSDOT intends to inventory and prioritize more outfalls in the central Puget Sound area, contingent upon available funding. Additionally, a system to track post-inventory retrofits will continue to be explored and refined. This will require close cooperation with regional offices to identify improvements from recent stormwater retrofit projects.

The Stormwater Outfall Inventory Database has undergone significant revisions in order to manage large amounts of data in a user-friendly format, and to provide a convenient means for numerous WSDOT program functions to obtain outfall information. During the recent reporting period, new features were added to the database, including: 1) automatic generation of prioritization scores based on the

prioritization index and criteria; 2) stormwater structure information; 3) display of photos and sketches with zoom capability; 4) water quality data importing tools; and 5) tools for facilitating data queries and exporting data for reports. These added features provide all known information for individual outfalls in one location for WSDOT user groups (e.g., maintenance, design, program management, and environmental offices). Changes to the database for the next reporting period include: 1) adding quality assurance procedures to ensure the accuracy of inventory data; 2) developing a methodology for tracking changes in the build environment; and 3) on-going modifications to increase user-friendliness based on input from inventory crews and database users.

Training on how to navigate the database to obtain information and generate standard reports to assist in decision making has been developed and will be offered in August and September 2003 to the user groups defined above. For the next reporting period, training efforts will focus on field inventory data collection for select WSDOT users in each region. It will include consistent interpretation of observed field conditions, consistent selection of effective mitigation technologies, and accuracy in the development of preliminary cost estimates for BMP implementation.

SECTION 5.0
CONSTRUCTION SITE CONTROLS AND TRAINING

The Erosion Control Program (ECP) provides technical assistance, training, and compliance assurance for WSDOT's construction projects. The mission of the Erosion Control Program is to aid in timely and cost-effective project delivery while minimizing environmental degradation caused by erosion. The following discussion outlines WSDOT's erosion control activities related to NPDES permit requirements for the current reporting period.

5.1 TECHNICAL ASSISTANCE

Technical assistance includes support to the WSDOT HQ Design and Construction Offices, as well as writing/updating statewide policies. WSDOT's designers are responsible for preparing Temporary Erosion and Sediment Control (TESC) plans. The ECP helps assess erosion risk for individual sites during the project design phase and helps select appropriate Best Management Practices based on the level of risk. Interpretation and clarification of WSDOT policies and TESC plan content is also provided.

To improve delivery of technical assistance, the ECP improved the existing Products and Services Database, which is an interactive database containing more than 500 products available on the market. The database is being imported to an intranet-capable software package to allow greater visibility and access for WSDOT personnel and contractors. This process should allow the database to be updated regularly, giving accurate pricing, vendor contact information, and new product submittal capabilities.

Through WSDOT's New Products Committee, the ECP continues to evaluate erosion/sediment control products that meet Ecology's standards for use on WSDOT projects. Products that meet agency specifications are added to the Qualified Products List (QPL). In the last year, over 200 products that had been approved through the New Products Committee were added to the QPL. This drastically simplifies the product selection, acceptance, and installation process, which is critical to implementing proactive field modifications in response to changing field conditions.

In addition to approval of products for use on WSDOT projects, the ECP participates on the Department of Ecology's Technical Review Committee, which is responsible for evaluating and approving new technologies using both passive and chemical methods.

The ECP also worked directly with the Design Office to create erosion control Standard Plans, which standardize fabrication and installation methods for specific items of work, and to complement other contract documents. It is expected to provide added guidance on proper BMP usage to project inspectors who oversee TESC activities, as well as to WSDOT's contractors. Partly in response to the Standard Plans, the erosion control sections for the upcoming *2004 Standard Specifications for Road, Bridge and Municipal Construction* were also updated.

As stated in the 2002 report, the ECP developed the TESC/SPCC Assessment Program and database, which measures compliance with the erosion and spill control Minimum Requirements outlined in the *Highway Runoff Manual* (WSDOT 1995). In the fall of 2002, the program provided immediate technical assistance to Project Engineer Offices on all in-water-work, as well as moderate and high-risk sites (a total of 29 sites). Reports generated using the Assessment Database were shared with Headquarters Design and Construction Offices to improve TESC planning, review, and implementation.

5.2 TRAINING

Keeping contractors and WSDOT employees abreast of new methods and products available for erosion control is a key responsibility of the ECP. It is accomplished through the *Construction Site Erosion and Sediment Control Certification Course,* which is required for WSDOT Design and Construction staff who either write or implement a TESC plan, and for contractors' Erosion and Sediment Control (ESC) Leads. During the 2002/2003 reporting period, 677 people took the certification course; of which 220 were WSDOT employees. The training numbers are down from the previous two years because WSDOT has caught up with the statewide demand for the course. All WSDOT projects visited by the ECP during the reporting period had contractors with certified ESC Leads.

In addition to the certification course, the ECP provided the Erosion Control Design Course, which focuses on risk analysis, BMP selection, scoping/budgeting, and contract preparation, to 25 WSDOT employees. The ECP also uses project design review and site visits as opportunities for informal Design Course training.

5.3 COMPLIANCE ASSURANCE

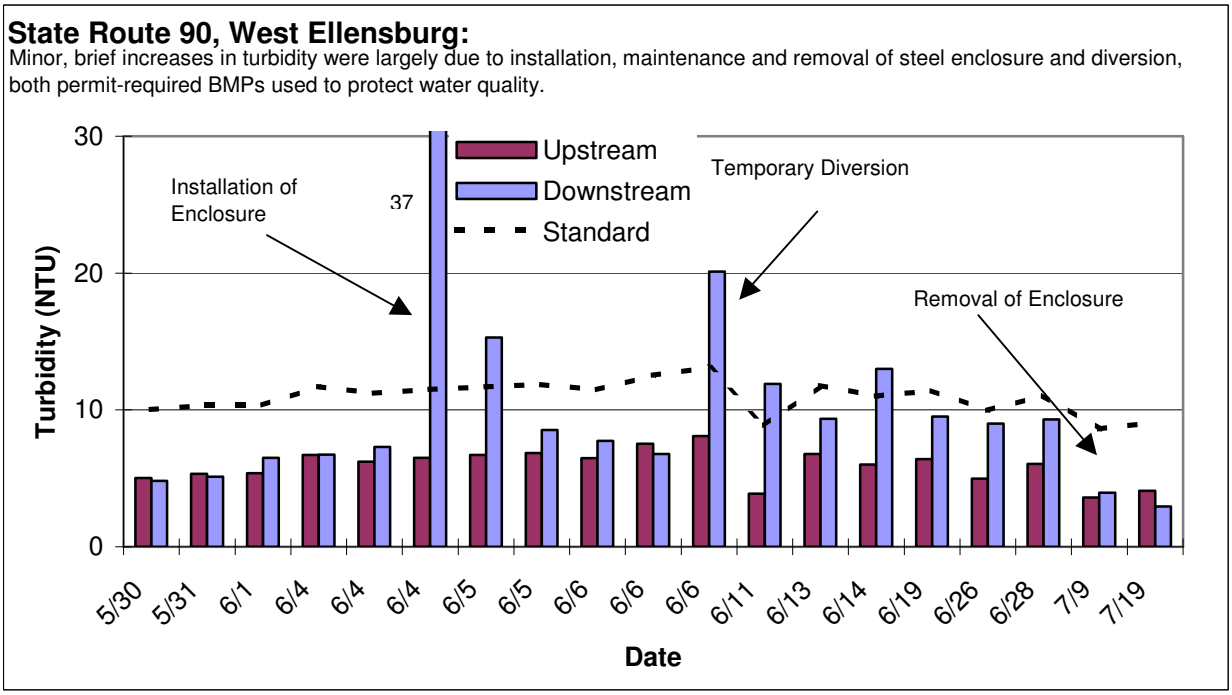
The ECP's compliance assurance program conducted a Fall Assessment in October of 2002. The Fall Assessment included an evaluation of all WSDOT projects and an analysis of erosion control activities

for the entire construction program. Assessed parameters include all of the minimum requirements in the Department of Ecology's 2001 Stormwater Management Manual for Western Washington (SMMWW) and other measures created by WSDOT to track and improve performance. Assessment results were stored and analyzed using the newly developed TESC/SPCC Assessment Database. The Fall Assessment evaluates WSDOT's readiness for upcoming winter weather and provides recommendations for fixing deficiencies. As can be seen in Table 5-1, WSDOT is performing well on all TESC Minimum Requirements and internal performance measures except the last five. These five areas are the main focus of improvement for the coming construction season. The 2002 Fall Assessment results were shared with management, and a plan was developed and implemented to improve TESC plan design and implementation through updated training courses, speaking engagements at WSDOT conferences, and plan review opportunities.

TABLE 5-1. EROSION & SEDIMENT CONTROL MINIMUM REQUIREMENTS	COMPLIANCE
*Contractor trained in proper use of erosion/sediment control measures	100%
Clearing limits/sensitive area boundaries identified and respected by contractor	100%
Utility trenches excavated in a manner to reduce erosion risk	100%
Water removal processes minimize erosion and sedimentation risks	100%
Construction access routes stabilized to prevent tracking of mud onto streets	98%
Effectiveness of sediment trapping measures	96%
Effectiveness of erosion control measures	91%
Sediment trapping measures installed prior to soil disturbing activities	90%
Stormwater conveyance channels stabilized	90%
Flow controlled to minimize offsite erosion	87%
* Would runoff would be clean if a storm occurred (no last-minute changes needed)?	86%
Would adjacent property be protected if a storm occurred (no last-minute changes needed)?	83%
Erosion and sediment control measures removed when no longer needed	81%
Protect storm drains from sediment	74%
Erosion and sediment control measures properly maintained	70%
Protect cut & fill slopes from concentrated stormwater runoff	67%
*Amount of disturbed soil actually covered with erosion control measures	65%
* Erosion control plans are on site and up-to-date	56%
* WSDOT performance measure in addition to Ecology 2001 SMMWW minimum requirements.	

To further the compliance assurance aspect of the ECP, WSDOT adopted protocols that standardize procedures for construction site water quality sampling and reporting. This policy requires monitoring on a subset of WSDOT's in-water work, and on moderate and high-erosion risk projects. This effort will allow WSDOT to track agency performance, set future monitoring priorities, and increase efficiency. Figure 5-1 is an example of the data generated as a result of this effort.

FIGURE 5-1. DATA GENERATED USING STANDARDIZED SAMPLING PROCEDURES



Another component of the ECP's compliance assurance activities is adoption of *Environmental Compliance Assurance Procedure for Construction Projects and Activities*. The procedure ensures that WSDOT management and resource agencies are notified promptly if non-complying activities do occur.

The ECP actively assesses WSDOT's projects, trains employees and contractors, monitors water quality, and has established reporting protocols to be followed if water quality is violated. WSDOT experienced minor problems with erosion control this year, which is a significant improvement over just a few years ago. As a result of recently implemented policies, procedures, and tools, WSDOT anticipates continued improvement in the future.

SECTION 6.0
OTHER PROGRAM COMPONENTS

This section of the WSDOT 2003 NPDES Annual Report contains information on other aspects of the Stormwater Management Program that have not been addressed in the Operations and Maintenance or Construction Site sections. It includes information on watershed planning and inter-agency coordination efforts, and status and progress on cost-benefit analyses for BMP selection and implementation.

6.1 PLANNING AND TMDL PARTICIPATION

WSDOT continues to develop a watershed approach to mitigating transportation project impacts. This approach is designed to direct transportation mitigation dollars toward projects that satisfy mitigation requirements while contributing to high priority watershed recovery efforts. In support of this objective, WSDOT is working with other state and local agencies and planning groups to provide watershed-scale technical support. This support includes participation in local/regional watershed planning, direct technical support to the planning of transportation projects, comprehensive watershed-wide characterization and assessment of major project impacts, and identification of potential mitigation opportunities.

The most active piece of WSDOT's watershed-based efforts in the past year has been development of a coordinated approach to watershed-based mitigation using watershed characterization to analyze functions, impacts, and potential mitigation sites. This work is being accomplished as part of the efforts of the Transportation Permit Efficiency and Accountability Committee (TPEAC) and is mandated by the legislature. This new evaluation process could occur well in advance of project planning, and will provide significant benefits to the environment while reducing mitigation costs and strengthening the National and State Environmental Policy Act (NEPA/SEPA) documentation and public participation process. The new evaluation process and underlying assumptions were pilot-tested on a project at SR 522 in Water Resource Inventory Area (WRIA) 7. The draft methodology and the results of this test are available for review on the Internet at:
http://www.wsdot.wa.gov/environment/streamlineact/watershed.htm

Currently, a "beta test" of the methodology is addressing potential impacts of the project to widen Interstate 405 between the Cedar River and the junction with Interstate 90 in WRIA 8. The new methodology is generating interest from local governments, other state agencies, other states, and the federal government.

The watershed characterization methods that are being developed seek a more complete understanding of project effects, assess the condition of surrounding natural resources, and identify potential mitigation options that have the greatest opportunity for maximizing environmental benefit while maintaining or reducing mitigation cost. A set of guiding principles directs methods development. To maximize environmental benefit, the efforts focus on the recovery of ecosystem processes. In western Washington, key ecological processes are assumed to be the delivery and routing of water, sediment, pollutants, large woody debris, heat, and habitat integrity/connectivity. Understanding the effects of transportation and surrounding land use impacts on ecological processes requires the formation of an interdisciplinary technical team comprised of (at minimum) a hydrologist, a hydrogeologist, an ecologist, a biologist, and a water quality specialist. This team has full access to Geographical Information Systems (GIS) staff, tools, and spatial data. Incorporating local watershed planning efforts early in the assessment process creates additional opportunities for the collection of locally developed data. Locally determined recovery priorities will be used for mitigation when they satisfy mitigation needs and fall within targeted recovery areas.

WSDOT continues to participate on committees associated with the Salmon Recovery Act (ESHB 2496), the Watershed Management Act (ESHB 2514), and numerous other state and local agency forums related to watershed governance and planning structures. River Corridor Analysis and the streambank protection guidelines are also used to address erosion/scour problems associated with transportation infrastructure throughout the state. WSDOT provides outreach and shares data with other watershed groups and planning entities when working on transportation projects.

In the Yakima Basin (WRIA 37), WSDOT completed an alternative analysis design process for the State Route 24 Bridge to select a new alignment that best meets local floodplain planning goals. Also in the Yakima Basin, WSDOT completed a reach analysis related to chronic environmental deficiencies on a portion of the Naches River, and is now proceeding with scoping the project for implementation. Reach analyses were also completed for the Snoqualmie River (WRIA 7) near Fall City on SR 202 and the Snohomish River (WRIA 7) near SR 522. A reach analysis is nearly complete for the Bogachiel River (WRIA 20), and analyses are being initiated for SR 410 (WRIA 9) and SR 22 near Toppenish (WRIA 37).

Although these projects are outside the NPDES permit area, they are further examples of the range of support WSDOT is providing to assist with watershed-based environmental planning, mitigation, and restoration efforts.

6.2 OPERATION AND MAINTENANCE COSTS AND COST/BENEFIT ANALYSIS

Herrera Environmental Consultants completed the cost report on implementation of NPDES stormwater control and ESA requirements (*Cost Analysis: Stormwater Management for Highway Improvement Projects in Western Washington*) during the reporting period. This cost analysis provides information regarding the cost requirements of the ESA and updated Ecology stormwater manual for highway improvement projects.

SECTION 7.0
MONITORING

This section of the document includes a description and summary of findings from stormwater characterization monitoring, BMP effectiveness/performance monitoring, and research monitoring activities that have occurred within the past year.

7.1 STORMWATER CHARACTERIZATION

The commitments to stormwater characterization monitoring described in WSDOT's SWMP include: routine monitoring of stormwater for total and dissolved solids, metals, nitrates, phosphates, petroleum products, and polynuclear aromatic hydrocarbons (PAHs); annual priority pollutant and pesticide scans; and wet and dry season testing of toxicity using Microtox (BBT) assays. All physical parameters were monitored during this reporting period except PAHs. Microtox testing was not performed.

7.1.1 General Characterization Monitoring

The purpose of this portion of the monitoring program is to characterize the quality of stormwater generated by state highways within the permit areas. Since stormwater quality may differ depending upon roadway use, four categories—defined by average daily traffic (ADT) volume—have been identified. These include low volume roadways (less than 30,000 ADT), medium volume roadways (30,000 to 100,000 ADT), high volume roadways (100,000 to 200,000 ADT), and ultra-high volume roadways (greater than 200,000 ADT).

Low, medium, and high volume sites close to Olympia, Washington were selected, in order to improve monitoring efficiency, reduce costs, and minimize differences in the character of rainfall events. Based on issues pertaining to the availability of funding to support the characterization effort, the general characterization mobilization, set-up, and monitoring effort was initiated in the spring of 2002. The three sites selected for monitoring are described below.

Low Volume: This site is located near milepost (MP) 16 on SR 8 and has an ADT of approximately 15,000 and an estimated drainage area of 3.4 acres. The site was previously used for stormwater research

as summarized in the WSDOT 4th Year NPDES Annual Report (WSDOT 1999). At the project site, SR 8 is a four-lane highway with two eastbound and two westbound lanes. Highway runoff from the eastbound lanes is directed through a wide grassy median strip to a culvert that discharges adjacent to the westbound lanes. Highway runoff from the westbound lanes sheetflows off the side of the road. Although runoff from the eastbound lanes is treated and detained to some extent in the median strip, it is considered to represent a valid characterization of low volume site pollutant contributions, since this is a common configuration for rural highways in the state of Washington.

Medium Volume: This site is located near MP 363 on SR 101. SR 101 at this location has an ADT of approximately 39,000 and an estimated drainage area of 3.8 acres. SR 101 in the project vicinity is also a four-lane highway with two eastbound and two westbound lanes. Runoff from both the eastbound and westbound portions of this highway segment are directed through catch basins and a vegetated median strip to a culvert that discharges on the north side of the westbound lanes.

High Volume: This site is located near MP 106.5 on Interstate 5 in Olympia. Interstate 5 at this location has an ADT of approximately 127,000, and the surface drainage area is estimated to be 6 acres. In the project area, the Interstate is six-lanes wide (three eastbound and three westbound lanes), with two exit ramps (one each direction). Untreated runoff from all of the travel lanes is directed through a series of culverts to a single culvert that drains to a stormwater treatment facility (detention pond, waterfall, bioswale, and a wetland cell) located on the south side of the highway.

A monitoring and quality assurance/quality control (QA/QC) plan (Tetra Tech and Envirovision 2002) was prepared for this general characterization monitoring and is on file with the WSDOT ESO Water Quality Program. Automatic samplers were installed in April of 2002 and were used to gather runoff data through May of 2003. Eleven storms were monitored at the SR 101 medium ADT and the SR 5 high ADT sites. Due to higher infiltration capacity of the median soils and the relatively low intensity of the storms that occurred following mobilization, only seven samples were collected at the SR 8 sampling station. Samples collected from the referenced sampling stations were analyzed at the laboratory for total suspended solids (TSS), total dissolved solids (TDS), chemical oxygen demand (COD), hardness, total phosphorous, 5-day biochemical oxygen demand (BOD5), nitrate/nitrite content, and for the inorganic elements cadmium, copper, lead, and zinc. In accordance with the referenced monitoring plan, grab samples were collected on the rising limb of the storm hydrograph and analyzed for the presence of total petroleum hydrocarbons (TPH) and ortho-phosphorous content.

TABLE 7-1. SUMMARY OF RESULTS FROM STORMWATER CHARACTERIZATION MONITORING

PERFORMED MAY 2002 - MAY 2003

Parameters	I-5			SR 101			SR 8			CALTRANs [5] reference
	Range [1]	No. of Samples	Mean[2]	Range	No. of Samples	Mean	Range	No. of Samples	Mean	Mean
TPH (Mg/L)	ND	7	ND	ND[3]	9	ND	ND	8	ND	NA
BOD (Mg/L)	5.0-15.9	7	8.37	ND-6.24	7	3.83	ND-5	6	2.50	NA
TDS (Mg/L)	ND-96.0	10	52.7	ND-66.0	9	38.7	ND-26.0	5	16.8	109.4 (mg/l)
T. Phosphorus (Mg/L)	ND-0.16	11	0.089	ND-0.15	11	0.05	ND-11.00	7	1.59	0.26 (mg/l)
Ortho-phosphorus (Mg/L)	ND	5	0.08	ND-0.15	5	0.09	ND-.176	3	0.04	NA
Nitrite + Nitrate (Mg/L)	ND-1.43	7	0.93	ND-.8	5	0.26	ND-.2	3	0.75	NA
COD (Mg/L)	54.0-130.0	10	73.5	13.0-82.0	9	47.6	13-59	6	20.8	117.9 (mg/l)
TSS (Mg/L)	3-160	11	81	4-136	11	50	2-15	7	7.14	76 (Mg/l)
Hardness [4] (Mg/L)	5.3-32.0	11	20.4	8.2-22.0	11	15.5	3.2-8.4	7	5.6	58.4 (mg/l)
Total Cadmium (Ug/L)	ND-1.80	11	0.76	ND-.57	11	0.29	ND-0.26	7	0.12	4.5 (Ug/L)
Dissolved Cadmium (Ug/L)	ND-0.76	11	0.33	ND-0.24	11	0.11	ND	7	0.16	0.33 (Ug/l)
Total Copper (Ug/L)	ND-58.00	11	28.18	ND-20.00	11	10.61	ND-5.40	7	2.91	4.85 (Ug/L)
Dissolved Copper (Ug/L)	ND-21	10	7.85	ND-8.00	11	5.85	ND	7	2.50	14.4 (Ug/l)
Total Lead (Ug/L)	ND-22.00	11	12.62	ND-39	11	12.72	ND-2.20	7	1.10	113.6 (Ug/L)
Dissolved Lead (Ug/L)	ND	9	0.5	ND-4.40	11	0.85	ND	7	0.44	4.68 (Ug/l)
Total Zinc (Ug/L)	7.3-220	11	129.70	26.00-170.00	11	61.90	ND-10	7	7.90	227.5 (Ug/L)
Dissolved Zinc (Ug/L)	ND-130	11	64.22	13.00-48.00	10	26.70	ND-8.90	7	5.03	73.7 (Ug/l)

(1) Range in measurements. (ND denotes values were measured that were below the detection limit.)
(2) Mean for all sampling dates. Samples that were below detection (<) were included in calculation of the mean by dividing the detection limit by 0.5.
(3) Range when all values are below detection limit
(4) Hardness values were used to calculate water quality limits for dissolved metals,
(5) Source: http://www.forester.net/sw_0103_caltran.html. Data from 1999-2000 California highway runoff character (Kayhanian et al., 2001)

Runoff characterization data indicate that untreated runoff from WSDOT highways is generally similar to or cleaner than runoff observed in other parts of the county—California Department of Transportation (CalTrans) Data is provided in Table 7-1 for comparison. The data indicate that WSDOT's SWMP was correct in identifying TSS and metals as parameters of concern, and that phosphorus may be a concern when runoff is discharged to phosphorus-sensitive water bodies. Characterization monitoring, however, indicates that dissolved solids, nitrates, and total petroleum hydrocarbons (TPH) do not warrant as much concern as initially suspected when the original SWMP was drafted.

Total Suspended Solids (TSS): Characterization monitoring shows that TSS concentrations in WSDOT runoff are comparable to concentrations observed in highway runoff elsewhere. Although not a regulated

parameter, TSS is of concern because it can be roughly correlated to sediment loading and turbidity. Sediment can gradually decrease treatment facility effectiveness and impact receiving waters.

Metals: Copper and zinc warrant the most concern among metals. Both metals were routinely detected in untreated runoff. Copper and zinc concentrations appear to be strongly correlated to ADT. Lead concentrations were much lower than previously observed, due largely to the elimination of leaded fuels. Cadmium concentrations were consistently low and often below detection limits.

Nutrients: Phosphorus data parallel other studies, indicating that phosphorus levels in highway runoff are generally low. Sixty-six percent of samples had phosphorus concentrations below detection or the range for which Ecology has established BMP treatment goals in its 2001 SMMWW. Twenty-seven percent of samples, however, had phosphorus concentration in the low end of the range for which treatment goals have been established. One unexplainably high concentration was observed on SR 8 in contrast to all other events having phosphorus levels that were below detection.

Nitrates: Nitrate concentrations were consistently low for all samples. While there is no surface water standard established for nitrates, samples fell well below the threshold value established in the state groundwater quality standards.

Total Petroleum Hydrocarbons: Total petroleum hydrocarbons concentrations were below detection limits in all 24 samples collected for that parameter. Characterization monitoring shows that the low TPH concentrations in WSDOT runoff are consistent with concentrations found in highway runoff elsewhere.

Stormwater sampling will resume in the 2003/2004 wet weather season. Emphasis will shift from general characterization to BMP effectiveness monitoring. Based on the results of the characterization data gathered in 2001-2003, the new monitoring effort will focus on the effectiveness of BMPs in reducing concentrations of the parameters of most concern as described above. WSDOT will collect samples at the inlet and outlet of recently installed water quality treatment BMPs. The characterization of BMP effluent will be reflective of runoff from highways with facilities that are designed to Department of Ecology's treatment standards. This effort will involve the establishment of six additional sampling locations within the Island-Snohomish and Cedar-Green permit areas. Sampling locations will be located along high volume ADT areas, with automated samplers installed at the inlets and outlets of stormwater treatment BMPs. General characterization data will still be collected as background samples from the BMP inlets.

7.1.2 Pesticide and Priority Pollutant Metals Monitoring

As mentioned earlier, catch basin sampling locations on SR 101 at MP 363 and on Interstate 5 at MP 106 in Olympia are being used as part of the stormwater pesticide and priority pollutant metals characterization monitoring program that the WSDOT ESO Water Quality Program is conducting pursuant to the requirements of the NPDES Phase I MS4 permit program. An additional sampling location is on Interstate 5 at the Ship Canal Bridge ultra-urban stormwater technology testing facility in Seattle. Sampling activities were performed at these locations in May 2003 by the WSDOT ESO Water Quality Program [Tetra Tech 2003(a)].

Sampling results are presented in Tables 7-2, 7-3, and 7-4. Results are comparable to those obtained during the previous reporting period.

TABLE 7-2. SUMMARY OF PRIORITY POLLUTANT METALS MONITORING RESULTS
WSDOT PESTICIDE AND PRIORITY POLLUTANT MONITORING
MAY 2003
[Results in milligrams/kilogram (mg/kg)]

Analytical Parameters	Sample Identification/ Sample Location					
	SR101-050103-01 SR 101	**SR5-050103-02 I-5 Indian Creek**	**SR5-050103-03 I-5 Ship Canal**	**SR5-050103-04 I-5 Ship Canal Field Duplicate**	**Statewide Background Levels[1]**	**Puget Sound Background Levels[1]**
Antimony	<6.5[2]	<5.8	<8.6	<8.8	5	NA[3]
Arsenic	<13	<12	<17	<18	6.99	7.30
Beryllium	<0.65	<0.58	<0.86	<0.88	1.44	0.61
Cadmium	<0.65	**2.3**[4]	<0.86	<0.88	0.99	0.77
Chromium	16	13	56	39	41.88	48.15
Copper	37	47	82	80	36.01	36.36
Lead	16	<5.8	63	66	17.09	16.83
Mercury	<0.32	<0.29	<0.43	<0.44	0.07	0.07
Nickel	21	16	26	34	38.19	38.19
Selenium	<13	<12	<17	<18	0.78	NA
Silver	<0.65	<0.58	<0.86	<0.88	0.61	NA
Thallium	<6.5	<5.8	<8.6	<8.8	NA	NA
Zinc	87	100	310	380	85.82	85.06

[1] 90th Percentile Background Values for Natural Background Soil Metals Concentrations. Washington State Department of Ecology Natural Background Soil Metals Concentrations for Washington State. Publication #94-115.

[2] < -indicates that the analyte was not detected above the specified laboratory practical quantitation limit (PQL).

[3] NA indicates not available

[4] **Bold** indicates a detected concentration greater than the Model Toxics Control Act Cleanup Regulation Method A Screening Level for Unrestricted Land Uses (WAC 173-340-900).

TABLE 7-3. SUMMARY OF ORGANOCHLORINE PESTICIDE SAMPLING RESULTS
WSDOT PESTICIDE AND PRIORITY POLLUTANT MONITORING
MAY 2003
[Results in micrograms/kilogram (ug/kg)]

Analytical Parameters	Sample Identification/ Sample Location			
	SR101-050103-01 SR 101-MP 363	SR5-050103-02 I-5-MP 106	SR5-050103-03 I-5 Ship Canal	SR5-050103-04 I-5 Ship Canal Field Duplicate
alpha-BHC	<6.5[1]	<5.8	<8.6	<8.8
gamma-BHC	<6.5	<5.8	<8.6	<8.8
heptachlor	<6.5	<5.8	<8.6	<8.8
Aldrin	<6.5	<5.8	<8.6	<8.8
beta-BHC	<6.5	<5.8	<8.6	<8.8
delta-BHC	<6.5	<5.8	<8.6	<8.8
Heptachlor epoxide	<6.5	<5.8	<8.6	<8.8
Endosulfan I	<6.5	<5.8	<8.6	<8.8
4,4'-DDE	<13	<12	<17	<18
Dieldrin	<13	<12	<17	<18
Endrin	<13	<12	<17	<18
Endosulfan II	<13	<12	<17	<18
4,4'-DDD	<13	<12	<17	<18
4,4'-DDT	<13	<12	<17	<18
Endrin Aldehyde	<13	<12	<17	<18
Endosulfan Sulfate	<13	<12	<17	<18
Methoxychlor	<13	<12	<17	<18
Endrin Ketone	<13	<12	<17	<18
Toxaphene	<130	<120	<170	<180
Chlordane (Technical)	<65	<58	<86	<88

[1] < -indicates that the analyte was not detected above the specified laboratory practical quantitation limit (PQL).

TABLE 7-4. SUMMARY OF CHLORINATED ACID HERBICIDE MONITORING RESULTS
WSDOT PESTICIDE AND PRIORITY POLLUTANT MONITORING
MAY 2003
[Results in micrograms/kilogram (ug/kg)]

Analytical Parameters	Sample Identification/ Sample Location			
	SR101-050103-01 SR 101	SR5-050103-02 I-5 Indian Creek	SR5-050103-03 I-5 Ship Canal	SR5-050103-04 I-5 Ship Canal Field Duplicate
Dalapon	<300[1]	<270[1]	<400	<400
Dicamba	<61	<55	<81	<82
MCPP	<6,100	<5,500	<8,100	<8,200
MCPA	<6,100	<5,500	<8,100	<8,200
Dichloroprop	<61	<55	<81	<83
2,4-D	<61	<55	<81	<82
2,4,5-TP (Silvex)	<62	<55	<82	<83
2,4,5-T	<62	<55	<82	<83
2,4-DB	<61	<55	<82	<83
Dinoseb	<61	<55	<81	<83

[1] < -indicates that the analyte was not detected above the specified laboratory practical quantitation limit (PQL).

7.1.3 Baysaver® Monitoring at State Route 101

The WSDOT ESO Water Quality Program performed the second year of monitoring events for the Baysaver® units (installed at five locations along SR 101 within the city of Port Angeles, in Clallam County) in February and May 2003 [Tetra Tech, Inc. 2003(b)]. The goal of this effort is to evaluate the pollutant removal effectiveness of the Baysaver® Separation System, an experimental BMP technology. Monitoring activities were performed to determine the concentration, volume, and characteristics of floatable pollutants retained in the aqueous phase within the units, and to characterize the accumulated sediments and water to be removed from the units relative to applicable solid or hazardous waste management disposal requirements. The information obtained has been provided to the WSDOT Maintenance program for use in maintaining the units.

Sediment sample analytical results show concentrations of the inorganic and semi-volatile compounds used to define a regulated waste under the Washington State Dangerous Waste Regulations to be below laboratory reporting limits. Only barium and *m*,*p*-cresol were detected in the analyses, and the concentrations were all in the range of three orders of magnitude less than the threshold values for designation as a regulated waste. Heavy oil range TPH constituents were present in sediment samples from all Baysaver® units at concentrations that exceed the soil cleanup levels established under the Model Toxics Control Act (MTCA). Grain size analyses were also conducted on samples from the primary and secondary chambers of Baysaver® No. 4 and Baysaver® No. 5. In general, the primary chambers retained a higher proportion of sand-sized sediment than did the secondary chambers, and the secondary chambers retained more evenly distributed grain sizes than did the primary chambers

This second monitoring event confirms the results obtained during the June 2002 monitoring effort and completes WSDOT's monitoring commitment.

7.1.4 Microtox® – Toxicity Studies

In the original Stormwater Management Plan, WSDOT intended to perform Microtox® testing. Since that time, several disadvantages associated with Microtox® testing have become more widely known. WSDOT consulted with Ecology's WET testing program to discuss the strengths and weaknesses of such testing and was advised of several disadvantages: 1) the test has relatively little sensitivity to metals (major component of stormwater); 2) the light response can be quite variable (reduction of light emission is the test variable measured); and 3) the bacteria species is a marine bacteria, so to avoid osmotic shock,

the sample has to be altered by adding salt or sugar. Because these disadvantages make it is difficult to interpret test results, WSDOT is focusing it's limited resources measuring other parameters.

7.2 RESEARCH AND BMP EFFECTIVENESS MONITORING

The following section describes WSDOT's stormwater and water quality research projects that are currently underway or have been completed during the 2002-2003 NPDES permit cycle. Most of the projects were originally included in the Stormwater Management Program plan (SWMP) (WSDOT 1997) that was developed to meet permit conditions. For fiscal year 2002-2003, WSDOT spent approximately $130,000 on stormwater and water quality research. Table 7-5 summarizes the active and recently completed WSDOT monitoring projects as of August 2003. See Appendix B for summaries of previously completed, non-active, or replaced monitoring projects.

Table 7-5. ACTIVE AND RECENTLY COMPLETED WSDOT RESEARCH PROJECTS (AS OF AUGUST 2003		
Project Name	**Status**	**Project Description**
Stormwater Permeable Reactive Infiltration Barriers (SPRIB) for Groundwater Protection Beneath Infiltration Galleries	Completed in Fall '02 • PI: Dr. David Yonge, WSU • WSDOT will propose to use SPRIB as a liner in infiltration galleries in lieu of prescribed pretreatment BMPs in areas where soils are highly permeable.	SPRIB is a sand/clay/mulch mixture that was developed by the USGS/Tacoma and WSU/Pullman as a filtration/sorption media lining the bottom of infiltration ponds and dry wells. The SPRIB mixture will allow projects to use a single facility for both water quality treatment and infiltration while protecting groundwater quality. Bench testing showed that the SPRIB mixture provided similar capture rates for TSS and markedly better capture rates for dissolved metals. Field testing on SR 90 in Spokane demonstrated that effluent from the SPRIB mixture met WA state groundwater and surface water quality standards for all monitored storm events.
Design Protocol for Sizing Infiltration Galleries	Completed in June '03 • PI: Dr. Joel Massman, UW • A significant modification of infiltration gallery design methods • Considers water quantity only • Both data collection and numerical modeling for infiltration design were addressed	This project attempts to improve estimates of saturated infiltration rates prior to construction. The major change was the realization that infiltration rates are a product of both hydraulic conductivity and hydraulic gradient. Hydraulic conductivity was estimated using air conductivity measurements of disturbed soil samples. Hydraulic gradient was estimated using an empirical equation derived from computer simulations based on the Green-Ampt equation.
Benefit/Cost Research	In Progress • PI: Dr. Gardner Brown, UW • Final Report anticipated in 2004	Stormwater retrofit projects historically have not been funded because of a lack of a credible methodology to determine the monetary benefits of the retrofits. This research is investigating whether valuation of stormwater treatment is possible and/or credible.
Ultra-Urban Stormwater Treatment Testing (I-5 Ship Canal Bridge) This location also serves as characterization site for ultra-high volume >200,000 ADT	In Progress • Sampling plans/QAPPs developed during 2002. • Stormfilter testing with modified media commenced in August '03. • Testing will continue through the '03–'04 wet season until 6 events have been monitored	Stormfilter is a stormwater treatment system based on media filtration/sorption using a patented self-cleaning canister. The tests will evaluate 2 untested media combinations: a zeolite/perlite mixture and a zeolite/perlite/granular activated carbon (GAC) mixture. The media are radially stratified such that the perlite (used for solids removal) is the outermost layer while zeolite (used for dissolved metals removal) or a zeolite/GAC (used for organics removal) mixture is the inner layer.
Ecology Embankment Monitoring – Phase 2	Phase 1 of this project was completed in '01. Phase 2 will likely commence in Fall '03, depending on funding availability.	The EE was given conditional approval for use as a basic and enhanced BMP. Phase 2 will evaluate maintenance and life-cycle performance of the Ecology Mix media as well as provide enough samples to satisfy the TAPE protocol.
Compost-Amended Filter Strips as a Low Impact Development Practice for Highways	Ongoing. The SR 5 – Martin Way stormwater monitoring site will be operational through the '03-'04 wet season.	Compost-amended filter strips (CAVFS) is a dual function retrofit strategy/BMP where existing roadsides are top-dressed with 4" of vegetated compost and reseeded. The CAVFS acts as a biofilter and has the ability to retain a very high percentage of runoff volumes for most storms. This project will quantify the infiltration and pollutant capture capacities of the SR5/Martin Way CAVFS so that they can be accurately modeled and eventually used as a basic and enhanced BMP.

7.2.1 Ultra-Urban Stormwater Technology Test Facility

This test facility was constructed to allow for ongoing testing and evaluation of new stormwater treatment technologies for potential use in highway applications. A summary of the facility design was provided in the NPDES Phase I permit 5th year report [WSDOT 2000], and a summary of the first four technologies selected for evaluation was provided in the 6th year report [WSDOT 2001].

The test facility is located underneath the I-5 Lake Union Ship Canal Bridge in downtown Seattle, and represents ultra-high ADT conditions. It is designed to collect highway runoff from the north half of the bridge and route it to four test bays through the use of flow splitters and pipe.

This project has been scaled back since the last reporting period. One treatment technology—Stormfilter—is being tested, rather than four. See Table 7-5, above, for details on Stormfilter.

7.2.2 Vegetated/Compost Amended Filter Strip

Beginning in the wet weather season of 2002/2003, stormwater runoff samples were collected from a site on I-5 near the Martin Way exit in Olympia, Washington to assess runoff conditions from a compost amended vegetated filter strip. Although attempts have been made to collect samples during five precipitation events, only two samples have been collected. This is due to the very low volumes of runoff being generated from the site, which prevents enough head to be generated in the culvert to be measured by automated samplers. This is indirect evidence that this approach to treating roadsides may be effective in reducing the quantity of runoff generated. Two more storm events are targeted; therefore a summary of results has not yet been prepared.

SECTION 8.0
CERTIFICATIONS

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
MUNICIPAL STORMWATER PERMIT PROGRAM

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for willful violations.

Megan White, P.E.
Environmental Services Office Director
Washington State Department of Transportation

Date

SECTION 9.0
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APPENDIX A

WSDOT 2003 BMP CONSTRUCTION ACTIVITIES SUMMARY

TABLE A-1. NEW BMPS CONSTRUCTED IN THE NORTHWEST REGION DURING THE 2002/2003 REPORTING PERIOD						
State Route	**Project Name**	**Mile Post or Station**	**Offset Direction**	**WQMA**	**BMP Type**	**Facility Size**
SR 90	I 90 Sunset I/C Modifications Stage 1	17.19	L	Cedar / Green	2 Cell Detention Pond	11,111 cu. m.
SR 202	Junction 228th Avenue NE	11.45	R	Cedar / Green River	Catch Basin Type 2 48 in. diam. W / Flow Restricter / Oil Separator	53.41 cu. ft.
SR 202	Junction 228th Avenue NE	11.38	L	Cedar / Green River	Infiltration Pond	1,028 sq. m.
SR 202	Junction 228th Avenue NE	11.71	L	Cedar / Green River	Bio-Swale	2180 sq. m.
SR 525	Junction Bayview Road	14.72	R	None	Detention Pond	352 cu. m.
SR 525	Junction Bayview Road	14.68	R	None	Bio-Swale	57.0 sq. m.
SR 525	Junction Bayview Road	14.5	R	None	Bio-Swale	13.78 sq. m.
SR 525	Junction Bayview Road	14.74	R	None	Bio-Swale	30.0 sq. m.
SR 410	Pierce / King Cl Vic and Jct SE 456th Street	23.61	L	South Puget Sound	Detention Pond	1440 cu. m.
SR 5	NE 175th SB on Ramp Channelization and Signal	176.88	L	Cedar / Green	Detention Pond	605 cu. m.
SR 5	NE 175th SB on Ramp Channelization and Signal	176.86	L	Cedar / Green	Catch Basin Type 2 1800 mm dia. W/ Oil / Water Separator	8.5 cu. m.
SR 5	NE 175th SB on Ramp Channelization and Signal	176.91	L	Cedar / Green	Bio-Swale	90 sq. m.
SR 5	NE 175th SB on Ramp Channelization and Signal	176.81	L	Cedar / Green	Bio-Swale	52 sq. m.
SR 5	NE 175th SB on Ramp Channelization and Signal	176.81	R	Cedar / Green	Bio-Swale	85 sq. m.
SR 20	SR 20 to Zylstra Road	25.87	L	None	Bio-Swale	1,150 sq. m.
SR 20	Vic. Campbell Lake Road	46.1	L	None	Bio-Swale	800 sq. ft.
SR 516	Junction Witte Road SE Channelization and Signal Rebuild	15.12	R	Cedar / Green River	Bio-Swale	30 sq. m.
SR 516	Junction Witte Road SE Channelization and Signal Rebuild	15.09	R	Cedar / Green River	Detention Pond	325 sq. m.
SR 5	164th to SR 526 - HOV Lanes	183.76	R	Cedar / Green River	Catch basin type 2 with Flow Restrictor - Oil / water Separator	5.11 cu. m.

TABLE A-1. NEW BMPS CONSTRUCTED IN THE NORTHWEST REGION DURING THE 2002/2003 REPORTING PERIOD						
State Route	**Project Name**	**Mile Post or Station**	**Offset Direction**	**WQMA**	**BMP Type**	**Facility Size**
SR 5	164th to SR 526 - HOV Lanes	183.79	R	Cedar / Green River	Detention Pond	314 sq. m.
SR 5	164th to SR 526 - HOV Lanes	183.94	L	Cedar / Green River	Detention Pond	297 sq. m.
SR 5	164th to SR 526 - HOV Lanes	183.94	L	Cedar / Green River	Bio-Swale	94.4 sq. m.
SR 5	164th to SR 526 - HOV Lanes	183.92	L	Cedar / Green River	Catch basin type 2 with Flow Restrictor - Oil / water Separator	4.44 cu.m.
SR 5	164th to SR 526 - HOV Lanes	183.82	R	Cedar / Green River	Bio-Swale	140 sq. m.
SR 5	164th to SR 526 - HOV Lanes	183.86	R	Cedar / Green River	Bio-Swale	78 sq. m.
SR 5	164th to SR 526 - HOV Lanes	183.97	R	Cedar / Green River	Bio-Swale	168 sq. m.

TABLE A-2. NEW BMPS CONSTRUCTED IN OLYMPIC REGION DURING THE 2002/2003 REPORTING PERIOD						
SR NO.	**Project Name**	**Milepost or Station**	**Offset Direction**	**WQMA**	**BMP Type**	**Facility Size**
SR 16	Sprague Ave. I/C To Snake Lake - HOV	A22 Line 1+260	L	South Puget Sound	Detention Pond	6,800 sf
SR 16	Sprague Ave. I/C To Snake Lake - HOV	NCL2 Line 1+240	R	South Puget Sound	Detention Pond	8,000 sf
SR 99	SR 99, 62ND Ave. E. TO King County Line	AR Line 11+32	L	South Puget Sound	Detention Pond	2,100 sf
SR 99	SR 99, 62ND Ave. E. TO King County Line	AR Line 12+38	L	South Puget Sound	Detention Pond	5,100 sf
SR 99	SR 99, 62ND Ave. E. TO King County Line	BS Line 1+56	C.L.	South Puget Sound	Bioswale	470 sf
SR 167	River Road Safety Improvements	L Line 7+000	L	South Puget Sound	Bioswale	2,065 sf
SR 509	Port of Tacoma Rd. Grade Separation	SFRC Line 0+820	R	South Puget Sound	Bioswale	1,000 sf
SR 509	Port of Tacoma Rd. Grade Separation	NFRC Line 1+210	R	South Puget Sound	Bioswale	1,200 sf
SR 509	Port of Tacoma Rd. Grade Separation	NFRC Line 1+765	R	South Puget Sound	Bioswale	900 sf
SR 509	Port of Tacoma Rd. Grade Separation	SR509C Line 4+600	R	South Puget Sound	Bioswale	3,000 sf
SR 509	Port of Tacoma Rd. Grade Separation	SFRC Line 1+040	R	South Puget Sound	Detention Pond	5,600 sf
SR 509	Port of Tacoma Rd. Grade Separation	SFRC Line 1+070	R	South Puget Sound	Detention Pond	5,000 sf
SR 509	Port of Tacoma Rd. Grade Separation	SR509C Line 3+800	L	South Puget Sound	Detention Pond	6,000 sf

APPENDIX B

WSDOT 2003 STORMWATER MONITORING AND RESEARCH ACTIVITIES SUMMARY

TABLE B-1. WSDOT MONITORING PROJECTS PREVIOUSLY COMPLETED AND SUMMARIZED		
Project Name	**Status**	**Project Description**
Vegetated Stormwater Facility Maintenance	Completed • Summarized in the 2001 NPDES Report.	Assess routine highway ditch cleaning alternatives to evaluate conditions benefiting water quality and assess restabilization and revegetation options.
Infiltration BMP Research, I-5 at Dupont	Completed [Ames, et. al. 2001] • Summarized in the 1999, 2000, and 2001 NPDES Annual Reports.	Originally used gypsum soil additives to limit infiltration rates in infiltration basins. However, the project shifted to developing a filtration media that could be used to top-dress infiltration basins.
Contaminant Detention in Highway Grass Filter Strips - SR 8	Completed (Yonge 2000) • Summarized in the 1999 and 2001 NPDES Annual Reports.	Investigation of potential for vegetated highway shoulders with different surface soils to remove pollutants.
Road Shoulder Treatments	Completed (Matthias et al. 1997) • Summarized in the 2001 NPDES Report.	Test different shoulder treatments (conventional asphalt, gravel, or porous asphalt) to determine which yields the least quantity of runoff with the highest quality.
Ecology Embankment/ Trench Filter, SR 167@ Kent and Auburn	Completed [Taylor and Assoc. 2002] • Summarized in the 2001 NPDES Report.	Evaluate effectiveness of media filtration in roadway embankments for pollutant removal.
Vortechs Swirl Concentration System SR 405	Completed [Taylor and Assoc. 2002(b)] • Summarized in the 2001 NPDES Report.	Evaluation of the pollutant removal effectiveness of a Vortechnics unit.
Dry Well Retrofit System – Spokane	Report in Progress • Summarized in the 2001 NPDES Report. • Report due in 2003.	Investigate a drywell retrofit strategy using SPRIB treatment media developed by the USGS.
PAM for Soil Erosion Control (SR 8)	Completed • Summarized in the 1999 NPDES Report.	Tested the performance of PAM to abate soil erosion and improve soil texture. Evaluated the optimum dosing method and application rates for prevention of erosion to exposed soils as evaluated through runoff turbidity data.
PAM Flocculant Dissolution	Completed • Summarized in the 1999 and 2000 NPDES Annual Reports.	Rate testing conducted for an Experimental Passive Dosing System to reduce stormwater turbidity.

TABLE B-2. NON-ACTIVE or REPLACED WSDOT MONITORING PROJECTS		
Project Name	**Status**	**Project Description**
Bike Path Runoff Characterization I 5	Non Active	Characterization of bike path runoff. This project was requested by the regional project office and is not related to any specific NPDES requirement.
Stormceptor Vaults SR 522	Non Active • Monitoring canceled due to hazardous location.	Pollutant removal effectiveness testing on installed facilities.
Ecology Ditch SR 5 Mountlake Terrace	Possible future testing. • No new installations to test.	Evaluate the effectiveness of the use of this treatment mechanism (a bioswale underlain with perforated pipe and sand).
I-5 / North Clark County Stormwater Characterization – Low Impervious Surface	Canceled • New site identified at US 101 near Olympia	Characterize stormwater runoff from a site with a medium ADT volume.
I-5 Vancouver	Canceled • New site identified at I-5 in Olympia	Characterize stormwater runoff from a site with a high ADT volume.
S. Snohomish Co. Multi-cell Wetpond Evaluation	Canceled • Not prioritized for funding.	Evaluate treatment effectiveness of a multi-cell wetpond with a constructed wetland.